

particular organism may under different conditions assume changes in shape, and that even under apparently the same conditions variations in shape and size may occur.

The organisms of a spherical shape are termed Coccii, the individual cells appearing as spheres, except during the period of fission, when elongated or lance-shaped forms occur—e.g., *Diplococcus pneumoniae*. The mode of cell-division determines the nomenclature applied to the various classes of coccii—those dividing in one direction and remaining attached in pairs or chains are termed diplo- or strepto-coccii; those dividing in two directions and forming groups of four—tetracoccii; those dividing in three directions and forming packets—sarcinæ; and those dividing irregularly into grape-like clusters—staphylococci.

The standard of measurement for bacteria is the *mikron*, equal to  $1/1000$  part of a millimetre, and represented by the sign  $\mu$ . The diameter of the coccii varies from about  $0.3$  to  $3\mu$ .

The organisms in which the length is always greater than the breadth are termed bacilli. Their shape is cylindrical, and they assume a rod-like form; of the most important forms the length may vary from  $0.5\mu$  to  $3.5\mu$ , and the breadth from  $0.5$  to  $0.8\mu$ . The bacilli may occur isolated, in pairs, or in chains.

The third main group, the spirilla, are spiral in shape, or more accurately their form represents the fraction of the thread of a screw. The spirilla, like the bacilli, divide in one direction, and may occur as comma, S-shaped or corkscrew forms. The cholera organism has a diameter of about  $0.4\mu$ .

The transverse diameter is usually taken as the standard of measurement, as it is more constant than the long diameter of the bacteria.

The dimensions of the organisms shown in the accompanying illustrations are as follows:—*Streptococcus pyogenes*,  $0.6$ – $0.8\mu$ ; *Staphylococcus pyogenes aureus*,  $0.7$ – $1\mu$ ; *Diplococcus pneumoniae*,  $0.5$ – $0.8\mu$ ; *Bacillus pestis*, B.  $0.6\mu$ , L.  $0.6$ – $1.9\mu$ ; *Spirillum cholerae*, B.  $0.4$ – $0.6\mu$ , L.  $0.8$ – $2\mu$ ; *Bacillus typhosus*, B.  $0.6$ – $0.8\mu$ , L.  $1.3$ – $2\mu$ ; *Bacillus tetani*, B.  $0.5\mu$ , L.  $1.2$ – $3.6\mu$ .

The example seen in Fig. 1 is the *Streptococcus pyogenes*, which is responsible for various septic processes in man. The grouping into chains is a characteristic feature of this organism. There is little variation in size of the individual members of the chain, with the exception of detached or isolated cells, which may be double the size of the normal coccii, e.g., when cell-division occurs. Micrococcii are not generally subject to such individual variations as bacilli, as can be seen in Fig. 2, *Staphylococcus pyogenes aureus*, where only slight variations in size are to be detected. In Fig. 3 is an example of a very pleomorphic organism, the plague bacillus. It is ordinarily a very short, thick rod, almost appearing as a diplococcus when subdivision occurs. In the photograph, one rod is seen which is about six times the size of the others, and this is by no means uncommon. In a fluid culture the form of the plague bacillus is entirely altered, the organism almost assuming the appearance of Fig. 1. The *Micrococcus pneumoniae* (Fig. 4) is one of the most variable of the diplococci, the individuals in a pair being rarely equal in size, and sometimes elongated, as seen in the photograph. The cholera organism (Fig. 5) is inconstant in size, and its chief characteristic is the bent rod or comma shape. The tetanus bacillus (Fig. 6) is of large size in relation to the other organisms noticed. It is usually a straight rod, except when spore-formation occurs, when it assumes the drum-stick appearance, as seen in the photograph. The typhoid bacillus (Figs. 7 and 8) is very variable in size, although its rod-like shape is constant. The organisms generally have been stained with gentian violet, except in Fig. 8, where Van Ermengem's method for demonstrating flagella has

been adopted. This process is not a true staining method, it is really a deposit of a silver-salt on the organism and its flagella. The organism appears much larger than when stained in the ordinary way. Many organisms are like the typhoid bacillus, endowed with flagella, which are probably exclusively organs of locomotion. In Fig. 8 they surround the bacillus, and are many times longer than the organism itself. In other organisms one finds sometimes unipolar or bi-polar flagella.

The illustrations accompanying this article have been produced in the photographic laboratory of the Jenner Institute of Preventive Medicine. The magnification is in all cases  $1750$  diameters, this being regarded as the highest at which satisfactory photographs of bacteria can be taken, a higher magnification generally resulting in the outline of the organism becoming blurred. The objectives used were a Zeiss 3 mm. apochromatic and a Winkel 1.8 mm. fluorite system, low-power projection oculars being used in each case, and magnification obtained by suitable camera extension. The organisms were all stained, so that a yellow screen was necessary when photographing. The screen used was a saturated solution of acridine yellow, about 15 mm. thick, and with this uniformly satisfactory results have been obtained.

ALLAN MACFADYEN.  
J. E. BARNARD.

#### NOTES.

THE 101ST anniversary of the death of Domenico Cirillo, friend of Linnaeus, and famous both as botanist and physician, occurred on Monday, October 29. The account of the life and work of this great Neapolitan, given by Prof. Giglioli in another part of the present issue, appears, therefore, at a very appropriate time, and will be read with much interest by every naturalist. We are glad to be able to publish this appreciative notice of some of Cirillo's contributions to science, and thus to add to the number of those who, knowing his works and career, will cherish his memory.

THE announcement of the death of Prof. Max Müller, at Oxford on Sunday last, has been received with universal regret. The funeral has been arranged to take place to-day at Holywell Cemetery, Oxford.

ACCORDING to a *Times* report from Constantinople, "An Imperial Iradé prohibits star-worship and Sabianism in Turkey." It would be interesting to know more exactly what has been prohibited.

THE new science laboratories at King's College were opened by Lord Lister on Tuesday afternoon.

THE death is announced of Mr. William Anderson, professor of anatomy to the Royal Academy of Arts, and the author of a number of works on surgery and anatomy.

A COURSE of Cantor lectures by Prof. J. A. Fleming, F.R.S., on "Electric Oscillations and Electric Waves," will be delivered on Monday evenings in November and December at the Society of Arts.

A DESTRUCTIVE series of earthquake shocks occurred at Caracas, the capital of Venezuela, and the surrounding districts on Tuesday, October 30. The town of Guaronas has been entirely destroyed.

A VISIT to the Chelsea Physic Garden is enough to convince any one of the urgent need of new greenhouses to replace the dilapidated structures in which the existing collections are housed. A more ruinous building than the central range it would be

difficult to imagine, and unless new accommodation be speedily provided for its inmates, the winter's mortality amongst them must be very great. We understand that plans for the erection of new planthouses have for some time been under consideration, and it is much to be hoped that they may be followed by tangible results with as little delay as possible. Under the new *régime*, the garden, with its increased resources, is proving of great use to institutions in which botany forms part of the curriculum, and it would be a great pity if, owing to avoidable damage, its growing utility should be impaired.

IT is stated in the *Bulletin* of the American Mathematical Society that the Steiner prizes of six thousand marks, which were not awarded, owing to no papers being presented, have been divided into three parts which have been given to Prof. Karl Friedrich Geiser, Zurich, for his researches in geometry and his services in the publication of Steiner's lectures; to Prof. David Hilbert, Göttingen, for his researches on the axioms of geometry and for the advancement which analytic geometry has experienced from his work on the theory of invariants, and to Prof. Ferdinand Lindemann, Munich, who has earned special distinction in geometry by his celebrated discussion of the quadrature of the circle, as well as by editing Clebsch's "Vorlesungen über Geometrie."

THE Senate of New York University has (says *Science*) received and confirmed the votes of its judges selecting thirty eminent native-born Americans whose names are to be inscribed in the "Hall of Fame," now in course of construction on University Heights, New York City. The Americans selected as the most eminent are distributed as follows: Rulers and statesmen, 7; authors, 4; inventors, 4; preachers and theologians, 3; judges and lawyers, 3; soldiers and sailors, 3; men of science, 2; philanthropists, 2; educators, 1; painters, 1. The inventors on this list are Fulton, Morse, Whitney and Howe, and the men of science Audubon and Gray. Franklin is of course also included. Of the hundred judges appointed, ninety-seven voted and the votes cast for men of science were as follows: John James Audubon, 67; Asa Gray, 51; Joseph Henry, 44; Matthew Fontaine Maury, 20; Benjamin Thompson, 19; Benjamin Silliman, 16; Benjamin Peirce, 14; Nathaniel Bowditch, 10; Alexander B. Bache, 9; Spencer Baird, 8; Henry Draper, 8; Maria Mitchell, 7; David Rittenhouse, 6. Twenty further names are to be selected in 1902 by the same judges.

REFERENCE has already been made to the medal which the Queensland Branch of the Royal Geographical Society of Australasia has decided to award. From a circular that has reached us, we learn that the medal has been instituted in recognition of Mr. J. P. Thomson's services to the Society, and is to be called "The Thomson Foundation Medal." It will be awarded annually, or at such other times as the Council may approve, to the author of the best original contribution to geographical literature.

IN memory of the late Dr. R. T. Manson, F.G.S., a well-known naturalist and geologist, a large granite boulder has been taken from the bed of the River Tees and placed on a pedestal in the Public Park, Darlington. The stone weighs about twelve tons, and it is admitted to have come originally from Shap, in Westmorland, in the Great Ice Age. It had been deposited 300 yards above Winston Bridge on the shale and limestone bed of the Tees, where the formation is of the carboniferous age.

THE Board of Education have received, through the Foreign Office, copies of the official translation of the statutes and regulations of the Nobel Bequest. It will be remembered that Dr. Nobel left a large sum, the interest on which was to be devoted to prizes to those who in the course of the previous year should have rendered the greatest service to mankind. The amount

thus available was to be divided into five equal parts, to be assigned as follows:—(1) To the most important discovery or invention in the domain of the physical sciences; (2) To the most important discovery or improvement in chemistry; (3) To the most important discovery in physiology or medicine; (4) To the most remarkable literary work (*l'ouvrage littéraire le plus remarquable dans le sens de l'idéalisme*); and (5) To the person who should have rendered the greatest service in the cause of international brotherhood, in the suppression or reduction of standing armies or in the establishment or furtherance of Peace Congresses. The competition was open to the whole world. It has been found necessary to embody the testator's wishes in a somewhat lengthy and complicated body of statutes. The Board of Education are causing copies of the official translation in French of these statutes to be transmitted to a number of the chief libraries in England and Wales, to the Universities and University Colleges, to a number of learned societies and to the Press. The regulations for the competition (which will, if possible, be held for the first time in 1901) can thus be consulted by persons interested in the matter.

IT is proposed to publish in separate volumes the lectures on the principles of geology, delivered at the Johns Hopkins University, under the George Huntington Memorial Fund; and subscriptions for the volumes are invited by Prof. W. Bullock Clark, Baltimore, Maryland, U.S.A. The lectures have been given by geologists of international reputation, a fund having been provided for that purpose by the generosity of Mrs. Williams, who thus commemorates the name and work of her husband, formerly professor of inorganic geology in the Johns Hopkins University. The lectureship was inaugurated in April, 1897, by Sir Archibald Geikie, who delivered six lectures on "The Founders of Geology," which have already been published by Messrs. Macmillan and Co. A second course was given in April, 1900, by Prof. W. C. Brögger, who delivered two lectures on the principles of a genetic classification of the igneous rocks, followed by five lectures on the late geological history of Scandinavia, as shown by changes of level and climate since the close of the glacial epoch. Other lectures will be delivered from time to time and will be published in a uniform style. The volumes will thus contain authoritative opinions regarding the fundamental facts of geological science.

THE first place in the *Quarterly Review* is given to a descriptive account of malaria and its relation to mosquitoes, in which some of the facts in seven recent volumes and reports dealing with the subject are considered. To any one who has not had before him the statistics as to the number of deaths from malaria, the mortality from the disease is astonishing. It has been said that one half the mortality of the human race is due to malaria, and though this may very well be an exaggeration, the figures given in the review show the deadly character of the disease and the vast extent of its field of activity. Apart from the mortality, it is stated that the disease probably levies a heavier tribute in the capacity of the officers and officials who administer the British Empire than does any other single agency. Laveran's discovery, in 1880, of the small organism responsible for the disease is, therefore, worthy of greater glory than the victories of any general or the triumph of any political party, for it has greater influence upon human affairs. Lankester had previously described a parasitic organism living in the blood-cells of a frog, and these purely scientific observations laid the foundation for the mosquito-malaric theory propounded by Dr. Manson, and established by the brilliant researches of Ross, Grassi, Bastianelli, Bignami and others. The whole story is told in the review, and it affords another instance of the far-reaching value of scientific work which at the commencement appears to have no practical applications.

In the Geological Series, Vol. i., No. 7, of the Field Columbian Museum publications, Dr. O. C. Farrington describes some new mineral occurrences in America. These include, amongst others, the rare inesite from a mine near Villa Corona, Mexico, a mineral which is only known from three other localities in the world; also some curious crystals of golden calcite from the Bad Lands region, which exhibit such distortion as to have an apparent prismatic form. There is an interesting note also on the use of dolomite as money by the Pomo Indians, inhabiting Lake County, California. The dolomite money is fashioned by cutting symmetrically-shaped cylindrical pieces from the rough pebbles. These are afterwards burned to bring out streaks of a reddish colour and are then polished and perforated. It is stated that a well-worked piece is estimated at almost the value of its weight in gold. A second section of this publication deals with some interesting crystal forms of calcite from Joplin, Missouri, which are remarkable "not only for their size, but for their transparency, varied colour and the perfection of their crystal form." The paper is well illustrated.

In an article on "The Orange River Ground Moraine" (*Trans. S. African Phil. Soc.* vol. xi. part 2, September 1900), Messrs. A. W. Rogers and E. H. L. Schwarz describe the glacial characters of the Prieska conglomerate which occurs beneath the Kimberley shales. In their opinion it is a true till formed by land-ice; numerous striae are to be found on the boulders, while the rock-surfaces underlying the conglomerate are clearly glaciated. A number of photographic plates support the conclusions of the authors. They remark that the relationship between the Prieska conglomerate and that known as the Dwyka conglomerate is still uncertain. The Dwyka conglomerate forms the base of the Mesozoic group, and has long been regarded as of glacial origin. An important paper on the chemical composition of the soils of the south-western districts of Cape Colony is contributed to the same publication by Mr. Charles F. Jurit.

PROF. W. M. DAVIS announces (*Appalachia*, vol. ix., March 1900) that his doubts as to the ability of ice to erode deep valleys and basins have been dispelled by a study of the valley of the Ticino, towards St. Gotthard. The fact that the side valleys open into the main valley several hundred feet up, indicates that the ice-stream, while deepening the main channel, rose high enough to prevent the small lateral glaciers from exercising much erosive power on their courses. In a second article (*Proc. Boston Soc. Nat. Hist.*, vol. xxix., July 1900) Prof. Davis pursues the subject of "Over-deepened main valleys and hanging lateral valleys," and deals also with the excavation of lake-basins by ice-action.

THE well-known formula for the velocity of propagation of capillary waves or "ripples" shows that the surface-tension of a liquid can be determined experimentally by observing the wave-length and velocity, or the wave-length and frequency of such waves. Dr. Leo Grunmach, of Berlin, has successfully applied this method to liquids, and he now communicates to the *Sitzungsberichte* of the Berlin Academy an account of determinations of the capillary constants of liquefied gases by the same method. The waves are excited by a tuning-fork with needle points dipping into the liquid, and the interference-curves enable the wave-lengths to be measured with considerable accuracy. The method has been applied to liquefied sulphurous acid, Pictet's fluid (a mixture of 64 parts by weight of sulphurous acid with 44 parts carbonic acid), liquefied ammonia and liquefied chlorine, and the values of the capillary constants will, it is surmised, lead to interesting results in connection with critical point investigations.

THE smallest lateral difference of place that is just visible has, until recently, been given as about 50" to 1' angular measure. The method employed by Helmholtz and others in reaching

this result was the well-known one of bringing two parallel lines together until they finally are just distinguished as two. Prof. George M. Stratton, writing in the *Psychological Review* for September, describes a different method by which it is now evident that a lateral difference of place of about 7" of arc can be directly perceived. Instead of using lines or points side by side, the experiments which gave this result were made with lines end to end, so arranged that the upper of two perpendiculars could be moved at will to the right or left, while still remaining exactly parallel to the lower line. The observer had simply to judge whether the upper line was continuous with the lower or to which side it was displaced. The results, which gave 7" as the threshold of space distinction under these conditions, are interesting, as explaining Bourdon's experiments, according to which a difference of position amounting to but 5" gives a perceptible stereoscopic effect.

MR. FRANK B. WILLIAMS contributes to the *Proceedings of the American Academy of Arts and Sciences* a paper on the geometry on ruled quartic surfaces. Of the quartic scrolls Cremona enumerates twelve, while Cayley divides these scrolls into ten species, stating that Cremona's two remaining species, though properly considered as distinct from the others, may be regarded as sub-forms of his seventh and ninth species. These two are the developable quartic or torse, whose edge of regression is a twisted cubic, and the quartic cones. It is the purpose of Mr. Williams's paper to consider the classification of curves on all ruled quartic surfaces, to find the formula for the number of intersections of any two curves that lie on the same ruled quartic surface, and to point out some of the most notable results obtained in the course of the investigation. The equations of many of the ruled quartic surfaces are so complicated that very serious difficulties arise when we attempt to treat them analytically, and the author finds it convenient to employ the synthetic method of Prof. Story.

MR. F. J. ROGERS, in the August number of the *Physical Review*, advocates the use of the M.K.S., or metre-kilogram-second, system of units in solving problems in mechanics where solutions involving the C.G.S. units of force and work lead to enormously large numerical measures. The author remarks that the common mode of abbreviating these large numbers by using powers of ten gives some trouble to beginners. Mr. Rogers suggests that the corresponding absolute unit of force may be called the large dyne, or the *Dyne* spelt with a big D; but this nomenclature seems capable of improvement in order to avoid confusion with the megadyne, which contains ten of his large dynes.

A SERIES of interesting experiments on the explosive effects of the modern infantry bullet have been carried out in Germany by C. Cranz and K. R. Koch. They used a new Mauser rifle of 6 mm. bore, having a muzzle velocity 100 m. greater than "Model 88." To imitate the effect upon large blood-vessels, while at the same time obtaining simple physical conditions, the experimenters constructed short hollow tin cylinders filled with water, and closed at one end with a sheet of rubber, and at the other with a sheet of parchment paper. Electrodes were mounted before or behind the cylinders, or inside them, and the discharge spark produced by the bullet was utilised to obtain a photograph of its silhouette at various points of its path. Among the important facts thus elicited it appears that the body struck is not displaced by the entry of the bullet. On leaving the body, the bullet carries away with it a small part of the hind surface, having a small round perforation through which the bullet passed. The "explosion" does not take place until the bullet has left the body. After discussing the evaporation, hydraulic-pressure, rotation, and sound-wave theories of the explosion, and discarding them all, the authors conclude that

the apparent explosion is due to the transfer of kinetic energy to the portions hit at later stages, which are thus torn away from those first encountered.

WE have received from Dr. W. Doberck a copy of the observations made at the Hong Kong Observatory during the year 1899, containing hourly values and results of the principal meteorological elements. The volume is the sixteenth of this important series, and the observations are enhanced in value by the fact of their publication on a uniform plan, which admits of comparison of the means of one year with those of another. The weather forecasts show a high degree of success; following the method of analysis usually adopted, and adding together the sum of total and partial success, the percentage amounts to 94. The collection of observations made in the eastern seas and their collation in one-degree squares, for the construction of trustworthy pilot charts, are actively carried on, and these observations are supplemented by registers kept at forty stations on shore. Astronomical and magnetic observations are also regularly made, and the results published in the volume above referred to. The time-ball was successfully dropped throughout the year, with only seven cases of failure.

IT was only in 1889 that Dr. Merriam, in the "North American Fauna," published a synopsis of the pocket-gophers of the genus *Perognathus*; but since that date a host of new species and races have been described. Accordingly, a revision of the group has been found necessary, which has been carried out by Mr. W. H. Osgood in No. 18 of the publication cited, several new forms being added to the already large list.

WE have received parts iii. and vi. of "Papers from the Harriman Alaska Expedition" (*Proc. Washington Academy*, vol. ii.), the former, by Mr. W. E. Ritter and Miss G. R. Crocker, dealing with the multiplication of rays in a 20-rayed starfish and its bilateral symmetry, and the latter, by Miss A. Robertson, treating of the Bryozoa. The most interesting feature in connection with the starfish (*Pycnopodia helianthoides*) is the presumed relation between one of its arms and the so-called larval organ of the embryo. In regard to the Bryozoa, Miss Robertson remarks that many of the Alaskan species are common to Queen Charlotte Islands, Paget Sound and California. The distribution of all the forms found on the western coast of North America is given, several new species being described.

THE first half of Part iv. of vol. xxviii. of the *Morphologisches Jahrbuch* is taken up by the final instalment of Dr. S. Paulli's important memoir on the pneumatic cavities in the mammalian skull. It is concluded that the homology of these cavities can only be determined by means of their relations to the nasal chamber, and that the terms "frontal" and "sphenoidal sinus" have no morphological value. In Monotremes, pneumatic chambers are wanting, and in other groups the capacity of these increases with the bodily size of the species in which they occur. The second half of the same fasciculus contains the commencement of a memoir by Prof. L. Bolk on the anatomy of apes, the gravid uterus of the langur (*Semnopithecus*) being the first subject for consideration.

DR. A. B. MEYER, the Director of the Dresden Museum, has sent us the first instalment of a work entitled "Ueber Museen des Ostens der Vereinigten Staaten von Nord Amerika; Reisestudien." In the autumn of 1899, Dr. Meyer undertook a journey to the States for the purpose of inspecting the museums and their methods of arrangement and conservancy, and the present issue describes some of the results of his survey. As is well known, Dr. Meyer has paid particular attention to the construction of museum cases and cabinets, and he seems to have been much interested in some of those in use in America.

The present part, which is lavishly illustrated, deals with the museums of New York City, Albany and Buffalo. One of the most striking photographs represents the gallery of Mexican antiquities in the American Museum of Natural History, New York.

WE have received "Verhandlungen der Deutschen Zoologischen Gesellschaft auf der zehnten Jahrestagung zu Graz, den 18, bis 20, April 1900," which contain a number of short papers on zoological subjects chiefly interesting to specialists. We have likewise been favoured with copies of the *Bulletin International de l'Academie des Sciences de Cracovie, Comptes rendus*, for May and July 1900. Among other papers, the latter contains a communication, by M. E. Godlewski, on the effects of oxygen on the development of the embryo of the frog; and a second, by M. S. Maziarski, on the structure of the salivary glands. The last-named author has succeeded in modelling these glands on an enlarged scale in wax, and his paper is illustrated by a plate showing some of these models.

THE following lectures will be given at the Royal Victoria Hall, Waterloo Road, during November:—November 6, "Plants of Long Ago," Mr. A. Seward, F.R.S.; November 13, "Flowers from an Insect's Point of View," Prof. J. B. Farmer; November 20, "The Medicinal Wells of Old London," Mr. W. H. Shrubsole; November 27, "Some Unknown Countries north of Tanganyika," Mr. J. E. S. Moore.

THE sixth volume of *The Reliquary and Illustrated Archaeologist*, comprising the four quarterly numbers issued this year, has been published by Messrs. Bemrose and Sons. The separate numbers of the magazine have been noticed in these columns as they appeared, but this need not prevent us from remarking that Mr. Romilly Allen, who edits the publication, and his fellow archaeologists, are to be congratulated upon the excellent character of the text and illustrations of their organ.

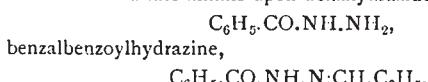
DR. M. C. COOKE's book entitled "One Thousand Objects for the Microscope" is well known to microscopists, and the new edition, which has just been published by Messrs. Frederick Warne and Co., is likely to have an even wider sphere of usefulness. Originally, the book consisted of a list of objects, with brief notes upon their microscopic characteristics. Preceding this, Dr. Cooke now gives a description of the microscope and its essential accessories, with hints on their manipulation, and on the collection and mounting of the different classes of objects enumerated. The book is thus now a complete guide for beginners of practical microscopy, and will be of assistance to all who have a microscope and wish to know how to make good use of it.

THE number of cases of the production of true nitro-derivatives in the fatty series by direct nitration with fuming nitric acid is practically limited to the work of Franchimont and Klobbie and Ruhemann and Orton on malonic acid derivatives. In the current number of the *Comptes rendus*, MM. Bouveault and Wahl give the results of some successful experiments upon the direct nitration of unsaturated fatty compounds. With the ethyl ester of dimethylacrylic acid, a good yield of a mono-nitro-derivative is formed, which possesses acid properties, forming a potassium salt; from which, on treating with acid, an ethyl nitrodimethylacrylate isomeric with the original compound is obtained.

NEARLY forty years ago Schönbein showed how, on shaking lead amalgam with air and water, equivalent quantities of lead oxide and hydrogen peroxide were formed. In recent years many isolated cases have been described of this so-called autoxidation or simultaneous oxidation of two substances by air, one being incapable of oxidation by air alone—the researches of Bamberger,

and of Manchot in particular, proving the production of hydrogen peroxide in such cases. Engler has recently suggested that probably in all such cases hydrogen peroxide is formed simultaneously, half the oxygen molecule going to oxidise the substance present, and the other atom forming hydrogen peroxide. In many cases the formation of the latter substance is difficult to prove on account of its secondary oxidising action upon the substance used. In the current number of the *Berichte*, Dr. H. Biltz describes experiments on the oxidation of the hydrazone of dibromoxybenzaldehyde in alkaline solution by air at the ordinary temperature, and in this case he has been able to prove that the amount of oxygen in the hydrogen peroxide formed is exactly equal to the oxygen used up by the hydrazone.

THE same number of the *Berichte* also contains an account by Prof. Curtius of what appears to be a new general method of preparing aromatic aldehydes from the corresponding acids. By the action of dilute alkalis upon benzhydrazine,



is obtained, and this gives benzaldehyde upon hydrolysis with dilute acids. Prof. Curtius makes no attempt to explain the mechanism of this reaction, but states that a similar reduction in alkaline solution has been found to take place with many acid hydrazides with formation of the corresponding tertiary hydrazones



the latter being insoluble substances capable of easy isolation in a pure state, and in good yields. Distillation with dilute sulphuric acid then gives the corresponding aldehyde.

THE additions to the Zoological Society's Gardens during the past week include two Common Marmosets (*Hapale jacchus*) from South-east Brazil, presented by Lady Mackenzie; a Persian Gazelle (*Gazella subguttlerosa*) from Central Asia, presented by Mr. B. T. Finch; a Red-necked Bustard (*Eupodotis ruficollis?*) from South Africa, presented by Mr. J. E. Matcham; a Raven (*Corvus corax*), European, presented by Mr. F. Sykes; seven Gold Pheasants (*Thaumalea picta*) from China, presented by Mr. Henry G. Hobbs; a Carrion Crow (*Corvus corone*) captured at sea, presented by Mr. S. T. Henderson; a Bearded Tit (*Panurus biarmicus*), European, presented by Mr. A. R. Gillman; a Spotted Slow Skink (*Acontias meleagris*) from South Africa, presented by Mr. W. L. Slater; a Green Lizard (*Lacerta viridis*), European, presented by Dr. Dyer; two Severe Macaws (*Ara severa*) from South America, two Spotted Eagle Owls (*Bubo maculosa*) from Africa, a Westerman's Eclectus (*Eclectus westermanni*) from Moluccas, six — Finches (*Munia*, sp. inc.) from India, two Simony's Lizards (*Lacerta simonyi*) from the Canaries, a Mocassin Snake (*Tropidonotus fasciatus*), a Caroline Anolis (*Anolis carolinensis*) from North America, two Leopardine Snakes (*Coluber leopardinus*), two Vivacious Snakes (*Tarophis fallax*), an Oesculapian Snake (*Coluber longissimus*), a Four-lined Snake (*Coluber quatuorlineatus*), a Lacertine Snake (*Coelopeltis monspessulana*), South European, deposited; two Hog Deer (*Cervus porcinus*), two Dwarf Turtle Doves (*Turtur humilis*), bred in the Gardens.

#### OUR ASTRONOMICAL COLUMN.

##### ASTRONOMICAL OCCURRENCES IN NOVEMBER.

Nov. 1. 9h. 11m. Minimum of Algol ( $\beta$ -Persei).

4. 6h. oh.

6. 9h. 54m. to 10h. 58m.  $\pi$  Arietis (mag. 5.6) occulted by the moon.

6. 13h. 47m. to 14h. 31m.  $\rho^3$  Arietis (mag. 5.5) occulted by the moon.

11. 14h. 38m. to 15h. 56m. 1 Cancer (mag. 5.9) occulted by the moon.

12. 11h. 54m. to 12h. 58m. A<sup>1</sup> Cancer (mag. 5.6) occulted by the moon.

12. 14h. 45m. to 14h. 56m. A<sup>2</sup> Cancer (mag. 5.8) occulted by the moon.

14. 5h. Mars in conjunction with moon. Mars 7° 39' N.

14-15. Epoch of the November meteors. Leonids. (Radiant 150° + 23°.)

15. Venus. Illuminated portion of disc = 0° 751. Mars. " " = 0° 896.

15. Saturn. Outer minor axis of outer ring = 15° 99'.

18. 13h. Venus in conjunction with moon. Venus 5° 51' N.

21. 10h. 53m. Minimum of Algol ( $\beta$  Persei).

21. 19h. 23m. Eclipse of the sun invisible at Greenwich.

23. 5h. Jupiter in conjunction with moon. Jupiter 1° 3' S.

23-24. Epoch of the meteoric shower of Biela's comet. (Radiant 25° + 43°.)

24. 7h. 42m. Minimum of Algol ( $\beta$  Persei).

24. 12h. Saturn in conjunction with moon. Saturn 2° 8' S.

27. 4h. 31m. Minimum of Algol ( $\beta$  Persei).

30. 6h. 11m. to 7h. 7m.  $\kappa$  Piscium (mag. 5.0) occulted by moon.

##### EPHEMERIS OF EROS FOR NOVEMBER.

###### Ephemeris for 12h. Berlin Mean Time.

1900.	R.A.			Decl.		
	h.	m.	s.	°	'	"
Nov. 1	2	15	8° 32'	+	53	51' 11" 3
	3		11 12' 42"		54	4 35' 2
	5		7 9' 87"		54	14 11' 0
	7		2 3 3' 43"		54	19 50' 8
	9		1 58 56' 02"		54	21 27' 8
	11		54 50' 81"		54	18 57' 3
	13		50 51' 14"		54	12 17' 6
	15		47 0' 38"		54	1 29' 6
	17		43 21' 88"		53	46 37' 7
	19		39 58' 79"		53	27 48' 8
	21		36 53' 99"		53	5 13' 1
	23		34 10' 09"		52	39 3' 2
	25		31 49' 22"		52	9 33' 6
	27		29 53' 06"		51	37 0' 3
	29		1 28 22' 83"		+	51 1 40' 1

FIREBALLS.—On Sunday evening, October 21, there appear to have been a remarkable prevalence of brilliant meteors. They were noticed at about 8h. 35m., 8h. 40m., 9h. 30m., 10h. and 11h. 58m. The first of these was a magnificent object, and it lit up the sky with three flashes which many people mistook for ordinary lightning. The night was very cold and clear throughout the country, and a great number of descriptions of the fireball alluded to have been published in the newspapers. Its flight was exceedingly slow from S.W. to N.E., and it appears to have been directed from a radiant point either in Capricornus or Aquila. The accounts are, however, somewhat conflicting. Near its disappearance the meteor had a height of between 20 and 30 miles over the Midlands, and a detonation was noticed at several places, including Tewkesbury and Clun, Shropshire.

On October 27, 11h. 42m., a magnificent meteor was seen by Mr. Denning at Bristol, traversing a path from 79° + 33° to 56° + 24°, and directed from a radiant at 136° + 34°. The object left a brilliant, irregular streak, one section of which remained visible in an opera glass for 13 minutes, during which time it drifted 17° in a southerly direction.

TEMPERATURE OBSERVATIONS DURING SOLAR ECLIPSE.—Mr. C. Martin made a systematic series of temperature observations during the eclipse of the sun on May 28, 1900, and his results are published in the *Scientific Proceedings of the Royal Dublin Society*, vol. ix. pt. 3, pp. 362-364. The observations were made with two instruments, one having a black bulb, the other with a white one. These were mounted about an inch apart on a black wooden post, some six feet high, the bulbs being six inches from any part of the woodwork, and pointed directly towards the sun. Parts of the first stages of the eclipse were rendered inactive by clouds, but for a period of two hours good readings were obtained. These are plotted as curves, the results from the two instruments being given both individually and in combination, the agreement being very close; if anything, the white bulb thermometer moved less quickly than the black,